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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/082,554	02/25/2002	Lothar Bauch	1999P2628	3145

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EXAMINER

GREENE, PERSHELLE L

ART UNIT

PAPER NUMBER

2826

DATE MAILED: 09/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/082,554

Applicant(s)

BAUCH ET AL.

Examiner

Pershelle Greene

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 and 10-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 10-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |                                                                                              |                                                                             |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

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Serial Number: 10/082554

Attorney's Docket #: 1999P2628

Filing Date: 02/25/2002

Applicant: Bauch et al.

Examiner: Pershelle Greene

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-7, 10 and 19 are being rejected under 35 U.S.C. 103(a) as being unpatentable over Chao et al. (U.S. Patent # 5,591,673), in view of Son (U.S. Patent # 6,072,242).

As to claim 1, Chao et al. shows, referring to figure 7, an integrated circuit structure having a first layer, a second layer, and an intermediate layer, a contact structure extending through the first layer, the second layer, and the intermediate layer for electrically connecting regions of the semiconductor structure. The contact structure has a first contact hole 13 filling in the first layer 10, a second contact hole 7 filling in the second layer 5, and an intermediate structure 8 in the intermediate layer and connecting the first contact hole 13 filling with the second contact hole 7 filling. The intermediate structure forms an interconnect having a length

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between longitudinal ends thereof. Chao et al. fails to explicitly show a interconnect having a contact area at each of the longitudinal ends with a contact area width perpendicular to the length and a connecting structure connecting the contact areas, wherein the connecting structure has a connecting structure area with a connecting structure area width perpendicular to the length, the contact area being greater than the connecting structure area width.

Son is cited for showing a contact structure of semiconductor memory device for reducing contact related defect and contact resistance. Specifically Son shows, referring to figures 4 and 6, a interconnect having a contact area at each of the longitudinal ends with a contact area width perpendicular to the length and a connecting structure connecting the contact areas, wherein the connecting structure has a connecting structure area with a connecting structure area width perpendicular to the length, the contact area being greater than the connecting structure area width. It would have been obvious to use the shape of Son's interconnect with the interconnect of Chao et al. for the purpose of increasing the contact area.

As to claims 2-7, 10 and 19, Chao et al. shows, referring to figure 7, a interconnect configured to connect two nearest points of a periodic basic grid disposed on the interconnect to one another. The contact area on the intermediate structure is a square contact area at each end of the interconnect. The interconnect and the contact areas define a bone-shaped form of the intermediate structure. The intermediate layer is a metallization plane and the intermediate structure is formed of a conductive material of the metallization plane. The contact hole fillings contain tungsten. The first and second layers are oxide layers. The first and second contact hole fillings are the only contact hole fillings contacting the intermediate structure. The first and second contact hole fillings are laterally offset relative to one another.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 11-18 and 20 are being rejected under 35 U.S.C. 103(a) as being unpatentable over Chao et al. (U.S. Patent # 5,591,673), in view of Huang (U.S. Patent # 6,353,269), and further in view of Son (U.S. Patent # 6,072,242).

As to claim 11, Chao et al. shows, referring to figure 7, an integrated circuit structure having a first layer, a second layer, and an intermediate layer, a contact structure extending through the first layer, the second layer, and the intermediate layer for electrically connecting regions of the semiconductor structure. The contact structure has a first contact hole 13 filling in the first layer 10, a second contact hole 7 filling in the second layer 5, and an intermediate structure 8 in the intermediate layer and connecting the first contact hole 13 filling with the second contact hole 7 filling. The intermediate structure forms an interconnect having a length between longitudinal ends thereof and a given width and a contact area at each of the longitudinal ends with a contact area width greater than the given width. Chao et al. fails to explicitly show the interconnect in a DRAM. Chao et al. also fails to explicitly show a interconnect having a contact area at each of the longitudinal ends with a contact area width perpendicular to the length and a connecting structure connecting the contact areas, wherein the connecting structure has a connecting structure area with a connecting structure area width

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perpendicular to the length, the contact area being greater than the connecting structure area width.

Huang is cited for showing a method for making cost-effective embedded DRAM structures compatible with logic circuit processing. Specifically, Huang shows, a DRAM having a stacked via. It would have been obvious to one of ordinary skill in the art to use the via of Chao et al. with the DRAM of Huang for the purpose of increasing device density.

Son is cited for showing a contact structure of semiconductor memory device for reducing contact related defect and contact resistance. Specifically Son shows, referring to figures 4 and 6, a interconnect having a contact area at each of the longitudinal ends with a contact area width perpendicular to the length and a connecting structure connecting the contact areas, wherein the connecting structure has a connecting structure area with a connecting structure area width perpendicular to the length, the contact area being greater than the connecting structure area width. It would have been obvious to use the shape of Son's interconnect with the interconnect of Chao et al. for the purpose of increasing the contact area.

As to claims 12-18 and 20, Chao et al. shows, referring to figure 7, a interconnect configured to connect two nearest points of a periodic basic grid disposed on the interconnect to one another. The contact area on the intermediate structure is a square contact area at each end of the interconnect. The interconnect and the contact areas define a bone-shaped form of the intermediate structure. The intermediate layer is a metallization plane and the intermediate structure is formed of a conductive material of the metallization plane. The contact hole fillings contain tungsten. The first and second layers are oxide layers. The first and second contact hole

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fillings are the only contact hole fillings contacting the intermediate structure. The first and second contact hole fillings are laterally offset relative to one another.

***Conclusion***

3. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pershelle Greene whose telephone number is 703-305-3870. The examiner can normally be reached on M-F 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 703-308-6601. The fax phone numbers for the


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organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

PLG

September 20, 2003



NATHAN J. FLYNN  
SUPERVISORY PATENT EXAMINER  
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